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Leveraging Human Factors to Improve CLABSI: Implementation of a Central Line Dressing Change Kit

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Background

- Central line associated blood stream infections (CLABSIs) were frequent in our institution and contribute to morbidity of our patients as well as cost of their stay.
- Maintenance of a central line is a complex process that relies heavily on human performance.
- Bedside apparent cause analyses identified the dressing change process as a leading risk factor for CLABSI
- Success has been achieved in reliability to central line maintenance utilizing human factors engineering concepts in another institution¹

Specific Aim

- Increase reliability of the dressing change process by implementing a dressing change kit and educating bedside staff in the use of the kit for routine central line dressing changes.
- Reduction of the institutional CLABSI rate.

Methods

- Multidisciplinary All Access Clinical Team and Vascular Access Team leaders collaborated to support dressing change kit implementation
- VAT collaborated with unit CLABSI leads to optimize kits for our organizational needs
- Kit contains multiple aspects designed to address human error through human factors engineering concepts
- Simulation-based hands-on training for all nurses who interact with central lines from July-November 2017
- Roll-out of dressing change kit and bedside nurse driven dressing changes December 2017

Methods

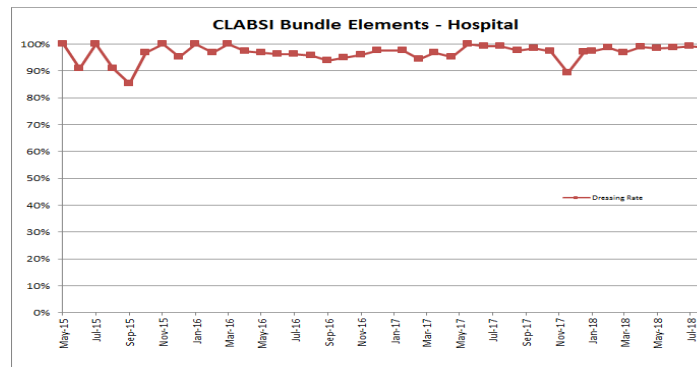
Table 1
Human factors engineering (HFE) principles, descriptions [references], implementation goals, and central line maintenance kit implementation

HFE principle	Description	Goal	Implementation
Affordances	Action possibilities and clues indicating how to use an object (eg, a mouse button invites pushing it) ²⁷	Make use intuitive	Tabs to open kit, visibility of flaps of pockets
Task intrinsic guidance	Intrinsic design with rich visual cues and interactivity ²⁸ that provides guidance and nullifies the necessity of an external checklist ²⁹	Provide structure and preview of task sequence	Sequential order of pockets; when multiple items, then additional information about sequence of use
Nudging	Creation of situations where external design factors influence behavior in a predictable and desirable manner ³⁰	Support adherence by suggesting desirable actions or excluding undesirable actions	Providing hand gel in pockets, providing pen to remind to date the dressing
Smart defaults	Defaults are decision alternatives where no active selection is necessary. ³¹ Smart defaults increase compliance and optimize outcomes	Help select desirable actions or material to perform activity	Selection of materials that if used follow best practices (StatLock [Bard Medical, Covington, GA], bio patch, site scrub, chlorhexidine scrub)
Feedback	Feedback is critical for positive adherence and improving performance (eg, clinical performance improves with anesthesia equipment through salient visual feedback of deviations from normal values) ^{32,33}	Allow easy resumption and assessment of current performance	Pockets are empty after completion of step supporting resumption
Minimizing cognitive effort	Individuals rely on simple and efficient strategies to minimize cognitive effort. ³⁴ Task design that minimizes or externalizes cognitive effort ³⁵ increases performance and adherence	Support the execution of a task by reducing the required cognitive resources	Chunking of related activities, icons, and labels as reminders; structured sequence; reduction in planning needs for procedure; and elimination of potential for omission
Minimizing physical effort	Minimization of a task's physical effort to minimizes user fatigue ³⁶	Make adherence convenient	Reduction of walking requirements (eg, to hand gel dispenser)

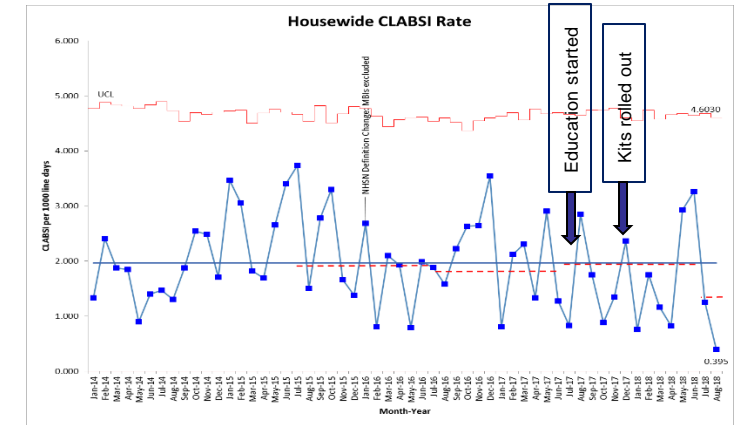
Draws, et al. Amer J Infect Control 2017



Results



Results



Conclusions

Implementation of a dressing change kit that addressed multiple aspects of human performance helped decrease the organizational CLABSI rate and improve reliability to the dressing change process

Acknowledgements

The members of the All Access Clinical Team, VAT, Simulation Department, as well as bedside staff across the organization are the reason this project is a success. Their tireless efforts continue to keep our patients safe

References

1. Draws FA, et al. Improving central line maintenance to reduce central line-associated bloodstream infections. Am J Infect Control 2017